In the Claims:

Please amend the claims as follows:

1. (currently amended) An apparatus for detecting hydrogenous materials, comprising:

a. a time-tagged neutron source that provides a stream of fast neutrons directed toward a target;

b. at least one sensing head comprising a neutron sensor and a neutron shield, wherein a portion of said stream of fast neutrons is backscattered from said target to said neutron sensor ~~that produces a neutron count signal dependent on the amount of hydrogenous material present in said target~~; and

c. a control system receiving a timing signal from said time-tagged neutron source and comprising a timing circuit, wherein said timing circuit is operable to disable ~~disables~~ said neutron sensor during a time delay beginning at the time said stream of fast neutrons is emitted from said neutron source and to enable ~~enables~~ said neutron sensor after said time delay wherein said neutron sensor produces a neutron count signal dependent on the amount of hydrogenous material present in said target.

2. (currently amended) The apparatus as recited in claim 1, wherein said timing circuit is operable to enable ~~enables~~ said neutron sensor after said time delay during a window and to disable ~~disables~~ said neutron sensor after said window.

3. (original) The apparatus as recited in claim 1, wherein said control system further comprises a pulse-height analyzer with at least one pulse-height discriminator setting.

4. (original) The apparatus as recited in claim 3, wherein said at least one pulse-height discriminator setting is an upper level discriminator setting.

5. (original) The apparatus as recited in claim 1, wherein said neutron sensor is capable of spatially resolving said neutron count signal so that the location of said target can be determined.

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6. (withdrawn from consideration) The apparatus as recited in claim 5, wherein said neutron sensor comprises a collimating material.

7. (original) The apparatus as recited in claim 5, wherein said neutron sensor comprises a coded-array aperture.

8. (original) The apparatus as recited in claim 1, wherein said neutron source is selected from the group consisting of a fission source, an (alpha, n) source, a (gamma, n) source, and combinations thereof.

9. (original) The apparatus as recited in claim 8, wherein said fission source comprises ^{252}Cf.

10. (withdrawn from consideration) The apparatus as recited in claim 1, wherein said neutron source is a neutron generator that is capable of being operated in pulse mode.

11. (original) The apparatus as recited in claim 1, wherein said neutron sensor comprises a material selected from the group consisting of ^{3}He, ^{10}B, ^{6}Li, and combinations thereof.

12. (original) The apparatus as recited in claim 1, wherein said neutron sensor is selected from the group consisting of a ^{3}He gas-proportional counter, a $^{10}BF_3$ gas-proportional counter, a scintillating glass containing ^{6}Li, a scintillating glass containing ^{10}B, a scintillating plastic containing ^{6}Li, a scintillating plastic containing ^{10}B, a scintillating crystal containing ^{6}Li, a scintillating crystal containing ^{10}B, and combinations thereof.

A1 cont.

13. (original) The apparatus as recited in claim 1, wherein said neutron shield comprises a material selected from the group consisting of ^{10}B, ^{6}Li, and combinations thereof.

14. (currently amended) The apparatus as recited in claim 1, further comprising an extension arm~~, one end of said extension arm connected to~~ extending between said control system and said sensing head and bearing at least a portion of the weight of said sensing head ~~and the other end of said extension arm connected to said control system~~.

15. (original) The apparatus as recited in claim 1, further comprising a user interface wherein said user interface comprises a means for communicating said neutron count signal to a user.

16. (withdrawn from consideration) A method for detecting hydrogenous materials

comprising the steps of:

a. directing a stream of fast neutrons from a neutron source toward a target;

b. detecting the time when said stream of fast neutrons is emitted from said neutron source;

c. measuring a portion of said stream of fast neutrons that is backscattered from said target after a time delay beginning when said stream of fast neutrons is emitted from said source; and

d. communicating said measurement to a user.

A1 cont.

17. (withdrawn from consideration) The method as recited in claim 16, wherein said measuring occurs after said time delay and only during a window.

18. (withdrawn from consideration) The method as recited in claim 16, further comprising the step of pulse-height discriminating said measurement.

19. (withdrawn from consideration) The method as recited in claim 18, wherein said discriminating is performed using an upper level discriminator setting.

20. (withdrawn from consideration) The method as recited in claim 16, wherein said target comprises an explosive.

21. (withdrawn from consideration) The method as recited in claim 16, wherein said explosive is a land mine.

22. (withdrawn from consideration) The method as recited in claim 16, wherein said explosive is unexploded ordinance.

23. (withdrawn from consideration) The method as recited in claim 16, wherein said target is contraband narcotics.

A1 cont.

24. (withdrawn from consideration) The method as recited in claim 16, wherein said target is biological tissue.

25. (new) An apparatus for detecting hydrogenous materials, comprising:

a. a time-tagged neutron source that provides neutrons directed toward a target and a timing signal indicative of the provision of said neutrons, wherein the provided neutrons include fast neutrons;

b. at least one sensing head comprising a neutron sensor and a neutron shield, wherein said neutron sensor is positioned to receive at least a portion of neutrons that are scattered from said target; and

c. a control system coupled to said neutron sensor and receiving said timing signal;

wherein said control system is programmed to enable and disable said neutron sensor based on said timing signal to discriminate against detecting fast neutrons that are not scattered from hydrogenous materials in the target.

26. (new) The apparatus of claim 25 wherein said neutron shield defines a cavity and said neutron source and said neutron sensor are within said cavity defined by said neutron shield.

27. (new) The apparatus of claim 26 further comprising an extension arm supporting said sensor head and positioned between at least a portion of said control system and said sensor head.

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28. (new) The apparatus of claim 25 wherein said time-tagged neutron source is positioned to provide neutrons into the ground for detecting a subterranean hydrogenous target.

29. (new) The apparatus of claim 28 in combination with a vehicle for transporting the sensor head while searching for subterranean hydrogenous targets.

30. (new) The apparatus of claim 25 wherein said control system includes a pulse-height analyzer and a pulse-height discriminator, wherein the pulse-height discriminator is an upper-level discriminator which discriminates against pulses having a height above a predetermined level.

31. (new) The apparatus of claim 30 wherein the control system is programmed to determine presence of hydrogenous materials based on pulses having a pulse-height below the predetermined level.

32. (new) The apparatus of claim 30 wherein the predetermined level is effective to cause the discriminator to discriminate against pulses attributable to fast neutrons that are received at the neutron sensor but that have not interacted with hydrogen in the target.

33. (new) The apparatus of claim 25, wherein said control system is further programmed to enable said neutron sensor after said time delay during a window and to disable said neutron sensor after said window.

34. (new) A method for detecting hydrogenous materials, comprising:

interrogating a target with neutrons from a neutron source and providing a timing signal indicative of the interrogating;

receiving neutrons scattered from said target with a neutron sensor and producing a neutron count signal dependent on the amount of hydrogenous material present in said target; and

based on said timing signal, enabling said neutron sensor after a time delay to discriminate against detecting fast neutrons that have not been scattered from hydrogenous materials in the target.

35. (new) The method of claim 34 wherein said neutron sensor is enabled during a window and disabled after said window.

36. (new) The method of claim 34 further comprising discriminating against neutrons having energies above a predetermined level as detected by the neutron sensor.

37. (new) The method of claim 34 further comprising spatially resolving said neutron count signal.

38. (new) The apparatus of claim 1 wherein said time delay is substantially greater than the time it would take for a fast neutron from said neutron source to directly traverse the shortest path from said neutron source to said target and then to said neutron sensor.